

# PHYSICAL AND HEALTH EDUCATION

CORE CONCEPT A - Human Performance

Student Resource A-1

ESSENTIAL ELEMENT 1. Structure and Function of the Human Body Lesson #2

## SKELETAL SYSTEM

### SKELETAL LANDMARKS continued

#### II. SHOULDER GIRDLE AND ARM

##### Clavicle

Sternal end: Palpate the rounded projection about the superior aspect of the sternum. The depression found between the sternal ends of the two clavicles is called the suprasternal notch.

Shaft: Palpate the anterior and superior surfaces from medial to lateral. Note that the anterior surface is convex medially and concave laterally.

Acromial End: This prominence of the lateral end of the clavicle, which articulates with the acromion process of the scapula and projects above it, is easily palpable.

##### Scapula

Inferior angle: Palpate the lowest portion of the scapula, which is the junction of the medial and lateral borders. If your subject consciously relaxes the shoulder girdle musculature the angle will be more easily palpated.

Medial (vertebral) border: This border is easily palpated about one and one-half inches lateral to the vertebrae.

Lateral (Axillary) border: With the arm and shoulder relaxed, the border may be palpated from the inferior angle to the axilla.

##### Humerus

Greater tubercle: With the arm in internal rotation palpate just distal to the anterior portion of the acromion process. As your subject internally rotates his arm you will feel it move under your fingers.

Lateral and medial epicondyles: With the forearm extended, palpate on the posterior surface of the elbow. Also, locate the ulnar nerve in the groove between the olecranon process and the medial epicondyle.

#### III. FOREARM, WRIST, AND HAND

##### Ulna

Olecranon process: This large process, the proximal end of the ulna, is easily palpated on the dorsal surface of the elbow joint.

Head: The head may be seen as a rounded projection on the dorsal surface of the forearm.

Styloid process: Palpate this small projection on the medial aspect of the head of the ulna. With your subjects' forearm in pronation, place one finger on the styloid and ask him to supinate. Note the changing position of the styloid as the ulna rotates.

##### Radius

Styloid process: Palpate on the lateral aspect of the wrist, proximal to the first metacarpal.

Source: Unknown

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### "SKELETAL SYSTEM - MANIPULATION LAB"

#### SKELETAL LANDMARKS

The skeletal landmarks included in this section are those which are relatively easy to identify on yourself or a subject. The ability to locate these landmarks is a necessary first step for the identification of muscles. It will also help you relate your knowledge of anatomy to your own body and it will facilitate your understanding of the function of the musculoskeletal system.

Recommended procedure for study of this section:

1. Identify the bony landmarks on the skeleton. The diagrams and overheads may aid as reference material.
2. Read the directions for locating the skeletal landmark and palpate or observe it on your subject.

Your study and analysis of motion will be facilitated if you develop an awareness of the relationship of the landmarks to each other and to the joint or joints in that anatomic area.

#### I. PELVIS, THIGH, AND KNEE

##### Ilium

Crest: The crest may be easily palpated or seen on most subjects. The highest point on the crest is at the level of the fourth lumbar vertebra.

Anterior Iliac Spine superior surface: Trace the crest forward to its most anterior surface.

Posterior superior Iliac spine: Follow the crest posteriorly to this prominence, which is about one and one half inches from the midline of the back. On many subjects a small depression will be seen at this site.

##### Femur

Greater trochanter: This is a large prominence which may be palpated about four to five inches inferior to the most lateral portion of the iliac crest. It will be found in the depression that appears when the thigh is abducted.

Medial and Lateral Condyles: When the knee is flexed, these are easily palpated on either side of the patella.

##### Patella

This is a bone which is easily seen and palpated. If the knee is in the extended position with the leg supported, it becomes freely movable because the quadriceps muscle is relaxed. The patella increases the leverage of the knee extensor muscles.

##### Tibia

Medial and lateral condyles: With the knee flexed, palpate just inferior to the femoral condyles.

continued

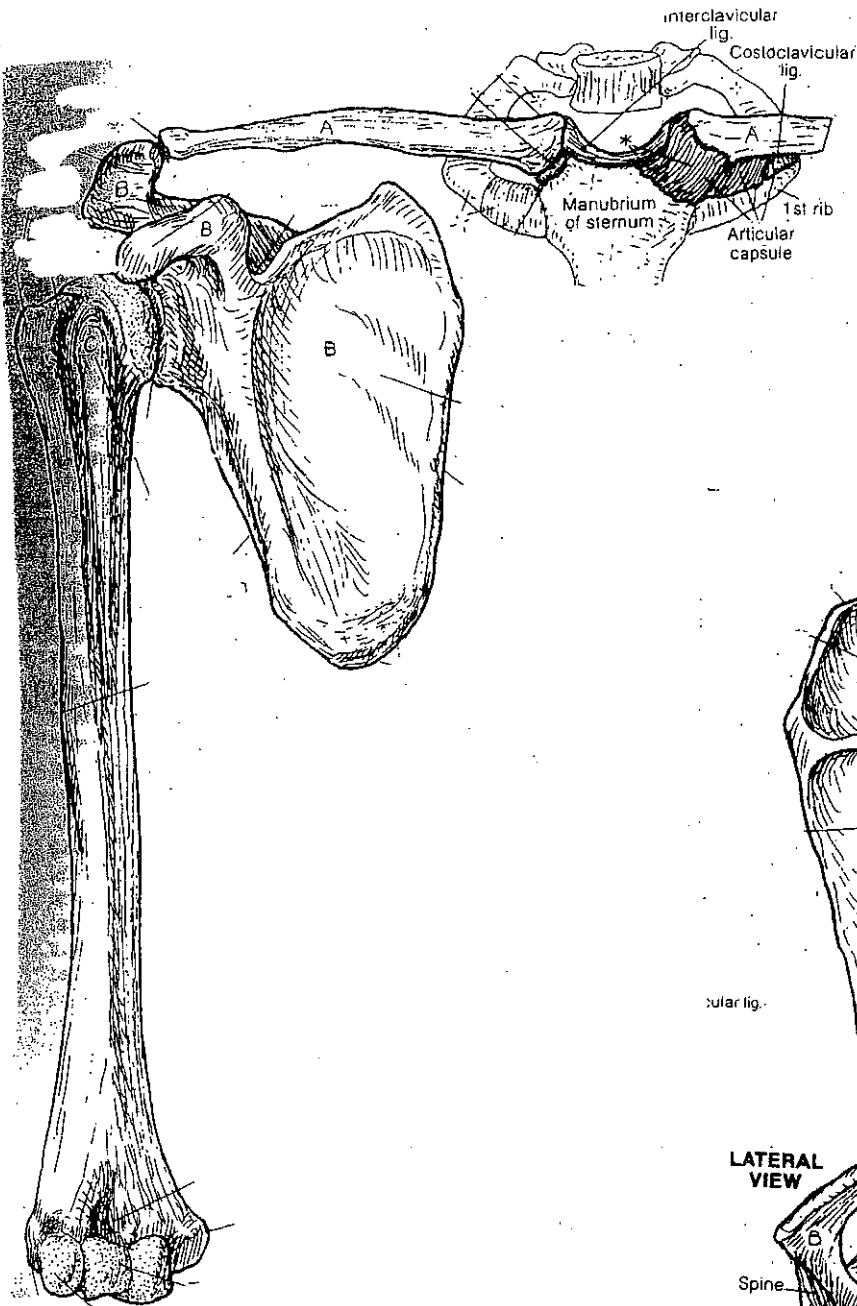
Lab - Oral Quiz

NAME \_\_\_\_\_

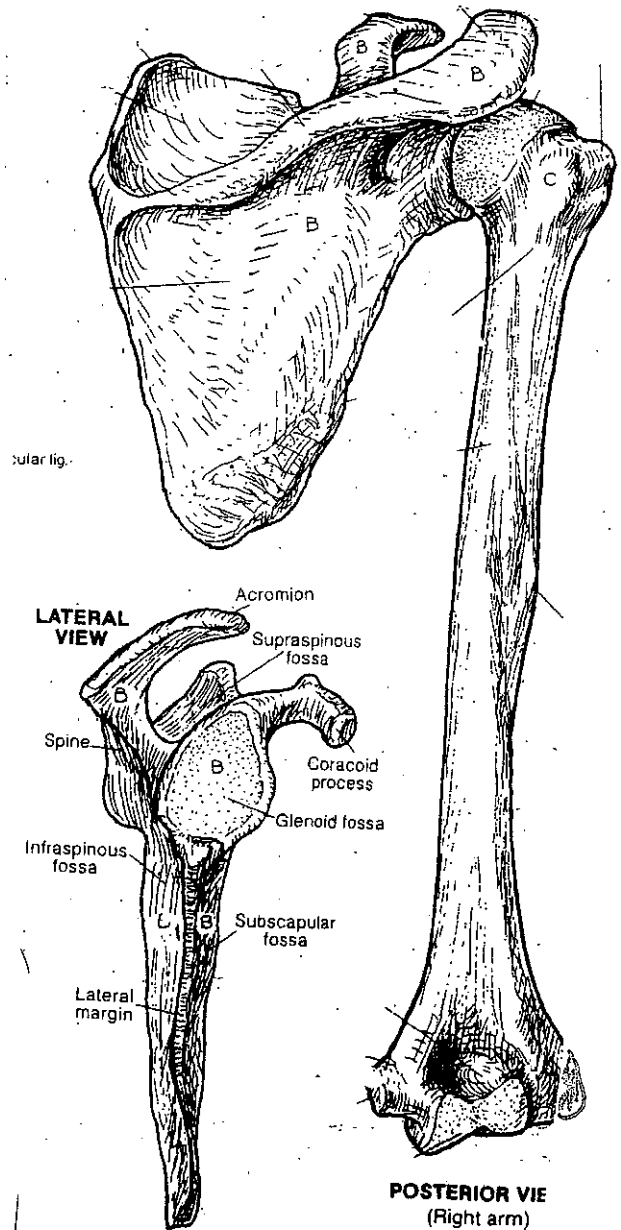
### Skeletal Landmarks - Manipulation Lab

BONE	LANDMARK	Incorrect 0	Close 1	Correct 3	TOTAL
Ilium	crest				
	anterior spine superior surface				
	posterior superior iliac spine				
Femur	greater trochanter				
	medial condyle				
	lateral condyle				
Patella					
Tibia	medial condyle				
	lateral condyle				
Clavicle	sternal end				
	shaft				
	acromial end				
Scapula	inferior angle				
	medial border				
	lateral border				
Humerus	greater tubercle				
	lateral epicondyle				
	medial epicondyle				
Ulna	olecranon process				
	head				
	styloid process				
Radius	styloid process				





**ANTERIOR VIEW**  
(Right arm)



**POSTERIOR VIEW**  
(Right arm)

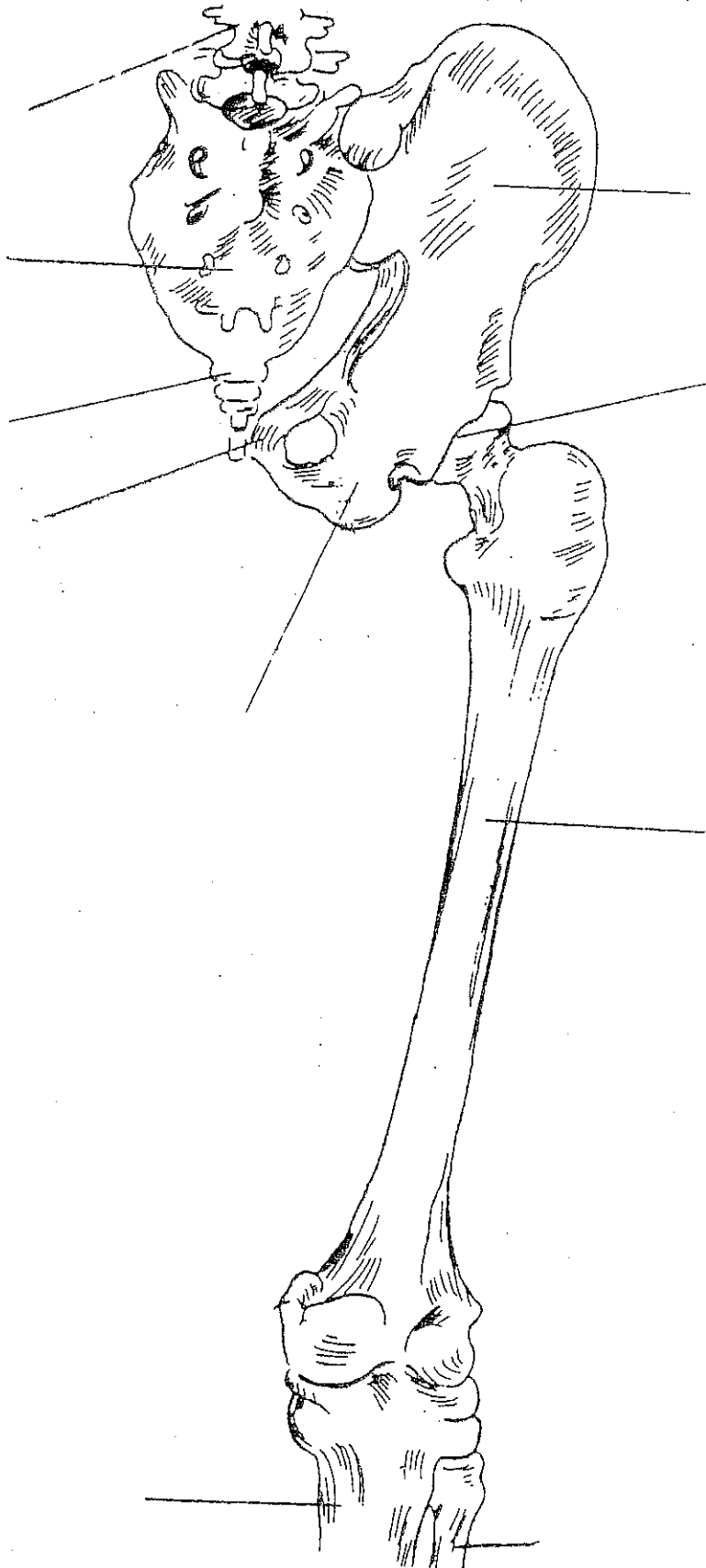
# PHYSICAL AND HEALTH EDUCATION

CORE CONCEPT A - Human Performance

Student Resource A-1  
Lesson #2

ESSENTIAL ELEMENT 1. Structure and Function of the Human Body

## SKELETAL SYSTEM - Relationship of Femur to Pelvis



# PHYSICAL AND HEALTH EDUCATION

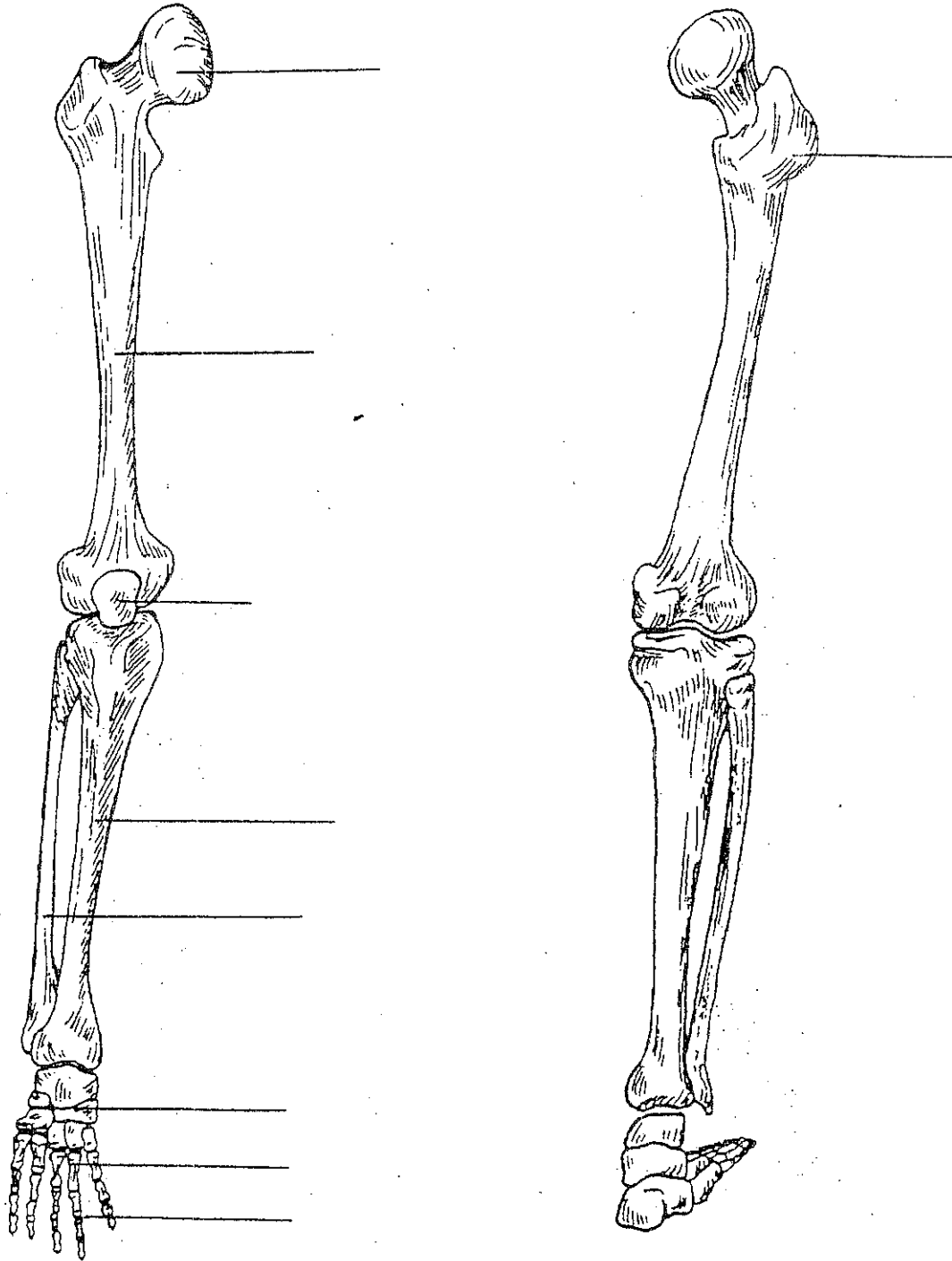
CORE CONCEPT A - Human Performance

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ESSENTIAL ELEMENT 1. Structure and Function of the Human Body Lesson #2

## SKELETAL SYSTEM

### Skeletal Structure of Leg and Foot



Anterior

Posterior

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## SKELETAL SYSTEM

### Skeletal Structure of Arm and Hand

Anterior View

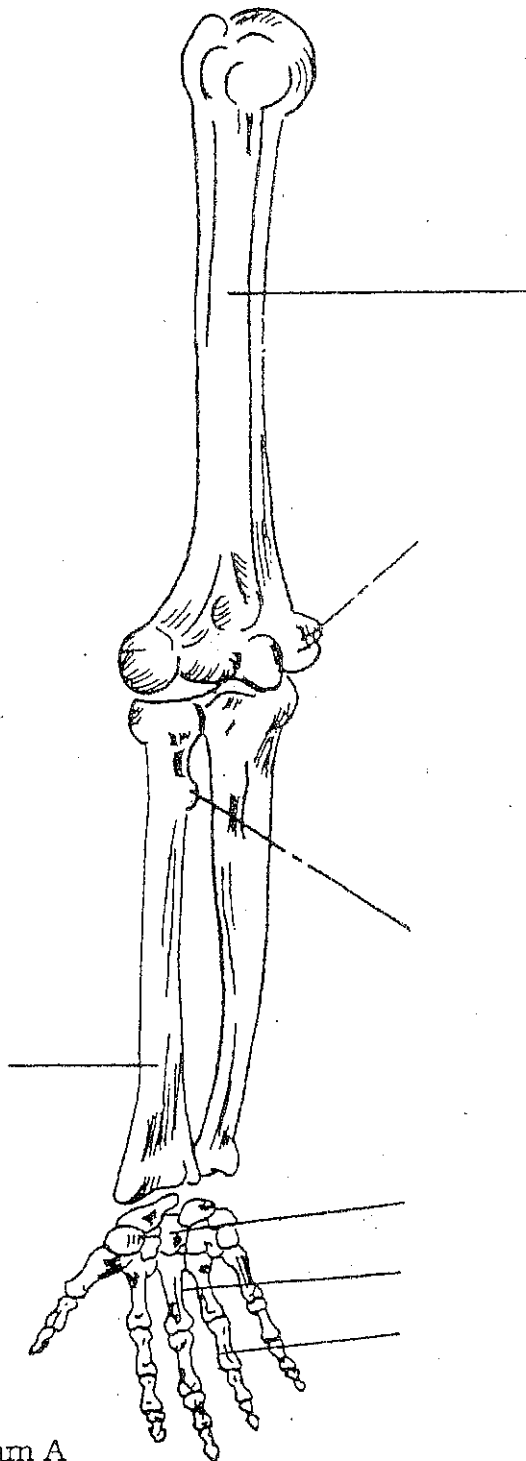


Diagram A

Posterior View

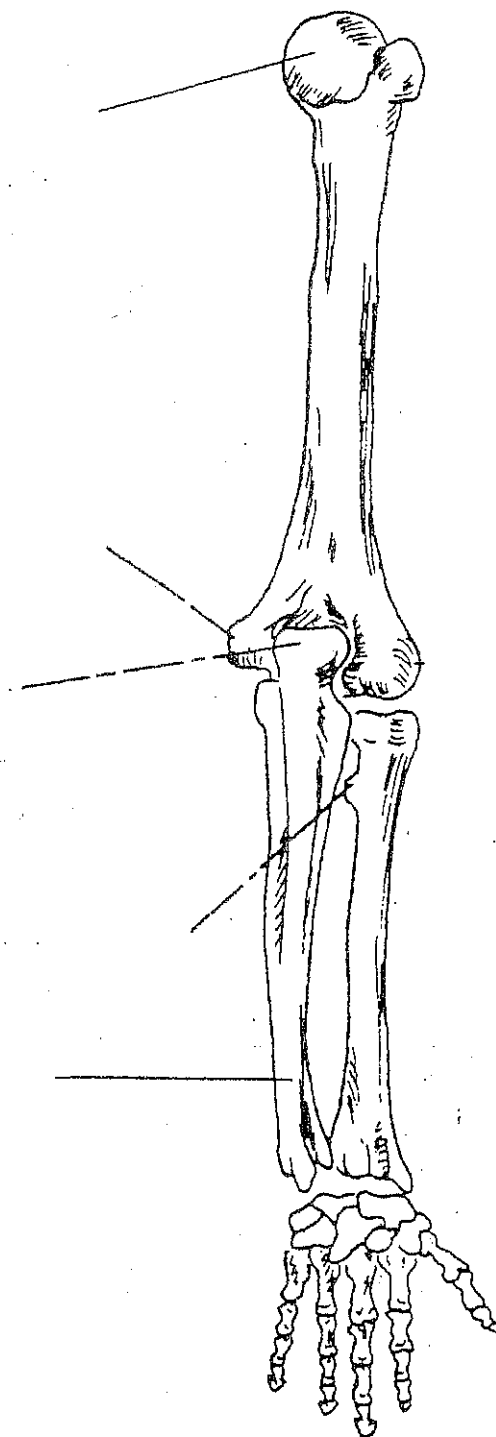


Diagram B



**Table 8-7 UPPER EXTREMITY BONES AND THEIR MARKINGS—cont'd**

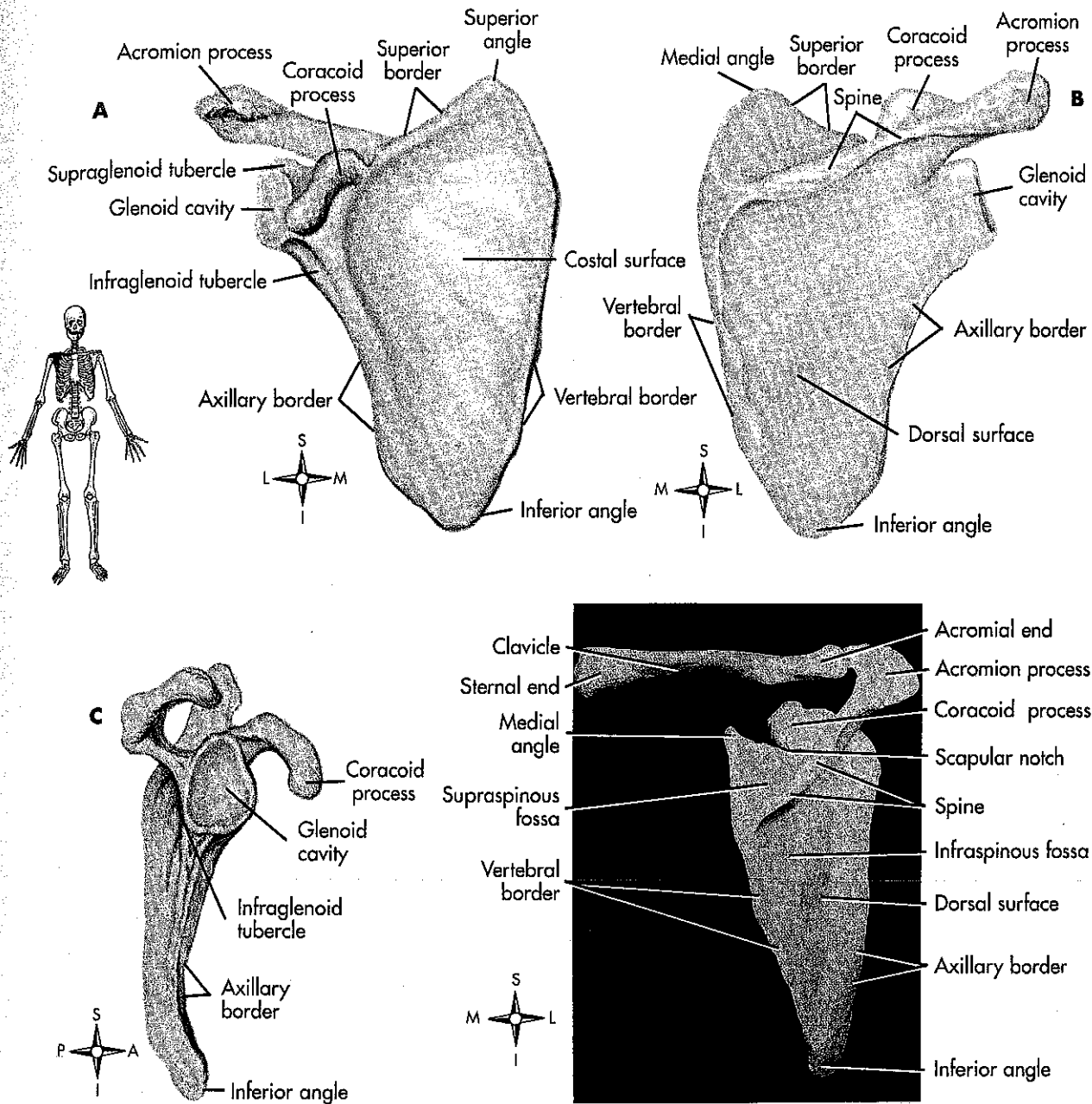
Bones and Markings	Description	Bones and Markings	Description
<b>HUMERUS—cont'd</b>		<b>RADIUS—cont'd</b>	
<b>Intertubercular groove</b>	Deep groove between greater and lesser tubercles; long tendon of biceps muscle lodges here	<b>Styloid process</b>	Protuberance at distal end (with forearm in anaton
<b>Surgical neck</b>	Region just below tubercles; so named because of its liability to fracture	<b>ULNA</b>	Bone of little finger side of
<b>Deltoid tuberosity</b>	V-shaped, rough area about midway down shaft where deltoid muscle inserts	<b>Olecranon process</b>	Elbow
<b>Radial groove</b>	Groove running obliquely downward from deltoid tuberosity; lodges radial nerve	<b>Coronoid process</b>	Projection on anterior surfac
<b>Epicondyles (medial and lateral)</b>	Rough projections at both sides of distal end		of ulna; trochlea of hum
<b>Capitulum</b>	Rounded knob below lateral epicondyle; articulates with radius; sometimes called <i>radial head of humerus</i>		between olecranon and
<b>Trochlea</b>	Projection with deep depression through center similar to shape of pulley; articulates with ulna	<b>Semilunar notch</b>	Curved notch between olec
<b>Olecranon fossa</b>	Depression on posterior surface just above trochlea; receives olecranon process of ulna when lower arm extends		process into which troc
<b>Coronoid fossa</b>	Depression on anterior surface above trochlea; receives coronoid process of ulna in flexion of lower arm	<b>Radial notch</b>	Curved notch lateral and in
<b>RADIUS</b>			notch; head of radius fi
<b>Head</b>	Disk-shaped process forming proximal end of radius; articulates with capitulum of humerus and with radial notch of ulna	<b>Head</b>	Rounded process at distal
<b>Radial tuberosity</b>	Roughened projection on ulnar side, short distance below head; biceps muscle inserts here		ulate with wrist bones; l
		<b>Styloid process</b>	Sharp protuberance at dist
			from outside on posteri
		<b>CARPALS</b>	Wrist bones; arranged in t
			mal end of hand; proxi
			finger toward thumb)—
			<i>scaphoid, lunate, and s</i>
			row— <i>hamate, capit</i>
			<i>trapezium</i>
		<b>METACARPALS</b>	Long bones forming frame
			hand; numbered 1 thro
		<b>PHALANGES</b>	Miniature long bones of fi
			(proximal, middle, dist
			two (proximal, distal)

little finger side. At the proximal end of the ulna the olecranon process projects posteriorly and the coronoid process projects anteriorly. There are also two depressions: the semilunar notch on the anterior surface and the radial notch on the lateral surface. The distal end has two projections: a rounded head and a sharper styloid process. For more detailed identification of these markings, see Table 8-7. The ulna articulates proximally with the humerus and radius and distally with a fibrocartilaginous disk, but not with any of the carpal bones.

The radius has three projections: two at its proximal end, the head and radial tuberosity, and one at

and 8-19). There are two proximal art with the capitulum of the humerus with the radial notch of the ulna. articulations are with the scapho carpal bones and with the head of tl

The eight **carpal bones** (Figure most people think of as the upper p but what, anatomically speaking, is one of these bones is evident from *pisiform bone*, which projects poster the finger side as a small rounded ments bind the carpals closely and in two rows of four each: proximal



**Figure 8-17. Right scapula. A, Anterior view. B, Posterior view. C, Lateral view. D, Posterior view showing articulation with clavicle. (The inset shows the relative position of the right scapula within the entire skeleton.)**

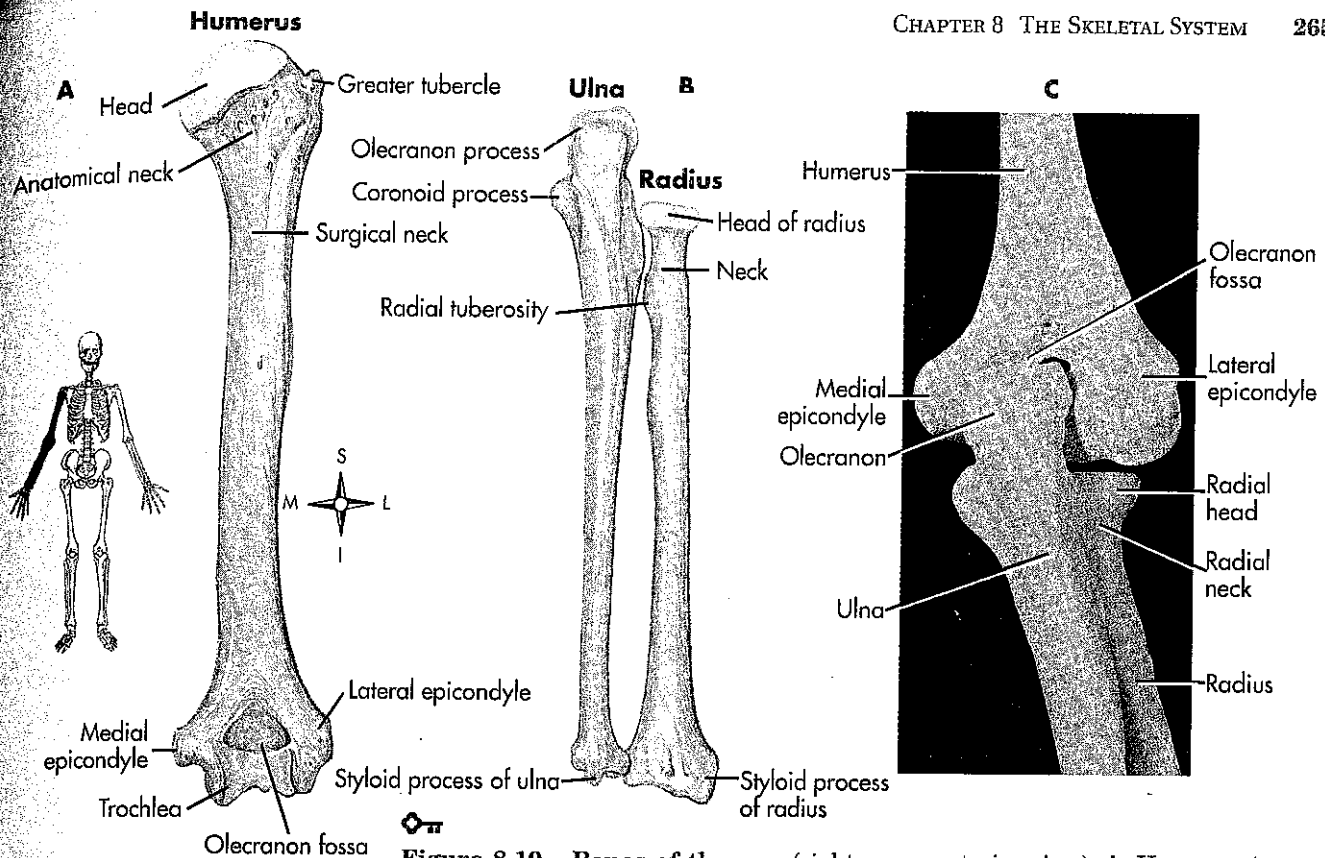
nate, and scaphoid bones; distal row—hamate, capitate, trapezoid, and trapezium bones. The joints between the carpals and radius permit wrist and hand movements.

Of the five **metacarpal bones** that form the framework of the hand, the thumb metacarpal forms the most freely movable joint with the carpals. This fact has great significance. Because of the wide range of movement possible between the thumb metacarpal and the trapezium, particularly the ability to oppose the thumb to the fingers, the human hand has much greater dexterity than the forepaw of any animal and has enabled humans to manipulate their environment effectively. The

heads of the metacarpals, prominent as the proximal knuckles of the hand, articulate with the phalanges.

### QUICK CHECK

- ✓ 1. What bones make up the shoulder girdle? Where does the shoulder girdle form a joint with the axial skeleton?
- ✓ 2. What are the two bones of the forearm? In the anatomical position, which one is lateral?
- ✓ 3. Name the bones of the hand and wrist.



**Figure 8-19.** Bones of the arm (right arm, posterior view). **A**, Humerus (upper arm). **B**, Radius and ulna (forearm). **C**, Elbow joint, showing how the distal end of the humerus joins the proximal ends of the radius and ulna. (The inset shows the relative position of the right arm bones within the entire skeleton.)

## FYI Palpable Bony Landmarks

Health professionals often identify externally palpable bony landmarks when dealing with the sick and injured. **Palpable bony landmarks** are bones that can be touched and identified through the skin. They serve as reference points in identifying other body structures.

There are externally palpable bony landmarks throughout the body. Many skull bones, such as the zygomatic bone, can be palpated. The medial and lateral epicondyles of the humerus, the olecranon process of the ulna, and the styloid process of the ulna and the radius at the wrist can be palpated on the upper extremity. The highest corner of the shoulder is the acromion process of the scapula.

When you put your hands on your hips, you can feel the superior edge of the ilium, called the *iliac crest*. The anterior end of the crest, called the *anterior superior iliac spine*, is a prominent landmark used often as a clinical reference. The *sacral promontory* is a prominent anteriorly projecting ridge or border on the superior aspect of the sacrum. It often serves as a palpable reference point when measuring the pelvis during obstetrical examinations. The medial malleolus of the tibia and the lateral malleolus of the fibula are prominent at the ankle. The calcaneus or heel bone is easily palpated on the posterior aspect of the foot. On the anterior aspect of the lower extremity, examples of palpable bony landmarks include the patella, or kneecap; the anterior border of the tibia, or shin bone; and the metatarsals and phalanges of the toes. Try to identify as many of the externally palpable bones of the skeleton as possible on your own body. Using these as points of reference will make it easier for you to visualize the placement of other bones that cannot be touched or palpated through the skin.

